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1                   Positioning Devices for a Sensor Element of a Miniature Fan

2                                   Background of the Invention

3                   1. Field of the Invention

4                   The present invention relates to positioning devices  
5 for a sensor element of a miniature fan.

6                   2. Description of the Related Art

7                   A wide variety of miniature fans have heretofore been  
8 provided. For example, U.S. Patent No. 5,492,458 discloses an  
9 electric fan including a housing having a hub formed in the  
10 center, a shaft having one end force-fitted in the hub and  
11 having an annular flange formed in the other end, two polar  
12 plates force-fitted on the shaft, and a stator disposed  
13 between the polar plates. Nevertheless, the starting effect  
14 of the motor of such an electric fan is not satisfactory as a  
15 sensor element on the circuit board for starting cannot be  
16 accurately aligned with an end edge of the polar plates. The  
17 present invention is intended to provide a positioning device  
18 for the sensor element which mitigates and/or obviates the  
19 above problems.

20                                   Summary of the Invention

21                   It is a primary object of the present invention to  
22 provide a positioning device which allows the motor of a  
23 miniature fan to be easily activated.

24                   A positioning device for a miniature fan in accordance  
25 with the present invention comprises a coil seat including a  
26 plurality of annularly spaced poles each having a stem and an

1 arcuate section. Each stem has a winding wound therearound,  
2 and each arcuate section has a first end edge and a second  
3 end edge. A circuit board is securely connected to the coil  
4 seat and includes a sensor element mounted thereon. The  
5 sensor element is located on a vertical line extending from  
6 one of the first end edge and the second end edge of one of  
7 the poles.

8 The pole having the first end edge or the second end  
9 edge aligned with the sensor element has a first mark means  
10 formed thereon, and the sensor element has a second mark  
11 means formed thereon which is aligned with the first mark  
12 means when mounting the sensor element onto the circuit board  
13 to assure that the sensor element is located on the vertical  
14 line.

15 The circuit board may include a notch defined therein  
16 for securely receiving the sensor element. The circuit board  
17 includes a third mark means aligned with the second mark  
18 means to provide a reference for mounting the sensor element  
19 in the notch by aligning with the second mark means of the  
20 sensor element with the third mark means.

21 Other objects, advantages, and novel features of the  
22 invention will become more apparent from the following  
23 detailed description when taken in conjunction with the  
24 accompanying drawings.

#### 25 Brief Description of the Drawings

26 Fig. 1 is an exploded perspective view of a

1 positioning device for miniature fans in accordance with the  
2 present invention;

3 Fig. 2 is a schematic side view of the positioning  
4 device in accordance with the present invention;

5 Fig. 3 is an exploded perspective view of a second  
6 embodiment of the positioning device in accordance with the  
7 present invention;

8 Fig. 4 is an exploded perspective view illustrating a  
9 third embodiment of the positioning device in accordance with  
10 the present invention; and

11 Fig. 5 is a schematic side view of the third  
12 embodiment of the positioning device.

13 Description of the Preferred Embodiments

14 Referring to the drawings and initially to Figs. 1 and  
15 2, a positioning device for miniature fans in accordance with  
16 the present invention generally includes a coil seat 1 and a  
17 circuit board 2. The coil seat 1 includes a number of  
18 annularly spaced poles 11 each having a <sup>radially extending</sup> stem 12 and <sup>a circumferential</sup> an  
19 arcuate section 18 with a first end edge 13 and a second end  
20 edge 14. The stem 12 of each pole 11 includes a winding 14  
21 wound therearound. The coil seat 1 includes a central opening  
22 15 for receiving an axle 21 formed on a side of the circuit  
23 board 2.

24 The circuit board 2 includes a plurality of electric  
25 elements 22 for controlling rotation of the fan, which is  
26 conventional and therefore not described in detail. A sensor

1 element 23 is mounted on the circuit board 2 in a manner that  
2 the first end edge 13 of one of the poles 11 aligns with the  
3 sensor element 23. For easy assembly, the first end edge 13  
4 has a first mark means 16 formed thereon, and the sensor  
5 element 23 includes a second mark means 24 formed thereon  
6 such that when mounting the sensor element 23 on the circuit  
7 board 2 (the circuit board 2 has been engaged with the coil  
8 seat 1), the second mark 24 is aligned with a first mark 16  
9 formed on the arcuate section 18 adjacent to the first end  
10 edge 13 to assure alignment of the sensor element 23 and the  
11 first end edge 13 in a vertical direction. The mark means 16  
12 and 24 may be lines, dots, etc. By such an arrangement, the  
13 sensor element 23 on the circuit board 2 is accurately  
14 aligned with the first end edge 13 of one of the poles 11 to  
15 thereby provide a reliable starting of a rotor of the motor  
16 (not shown), which is conventional and therefore not further  
17 described.

18 Fig. 3 illustrates a modified embodiment of the  
19 invention, wherein the circuit board 2 includes a notch 25  
20 defined therein for receiving the sensor element 23 with the  
21 second mark 24 formed thereon. In addition, a number of pin  
22 holes 26 are defined in the circuit board 2 adjacent to the  
23 notch 25 for receiving the pins (not shown) of the sensor  
24 element 23, which is conventional and therefore not further  
25 described. The circuit board 2 includes a third mark means 27  
26 formed adjacent to the notch 25. The mark means 16 and 24,

1 and 27 may be lines, dots, etc. In assembly, the third mark  
2 means 27, which is already in alignment with the first mark  
3 means 16, provides a reference for aligning with the second  
4 mark means 24 such that the sensor element 23 is in alignment  
5 with the first end edge 13 of one of the poles 11 to thereby  
6 provide a reliable activation of the rotor of the motor.

7 Figs. 4 and 5 illustrate a third embodiment of the  
8 invention, in which the second end edge 14 of one of the  
9 poles 11 aligns with the sensor element 23, while a first  
10 mark means 16 is provided on the arcuate section 18 adjacent  
11 to the rear end edge 14 to provide a reference for mounting  
12 the sensor element 23 onto the circuit board 2.

13 Conclusively, the sensor element 23 is located on a  
14 vertical line extending from the end edge 13, 14 of one of  
15 the poles 11 along a direction parallel to a longitudinal  
16 axis "X" of the coil seat 1 such that the rotor may be  
17 reliably activated to rotate.

18 Although the invention has been explained in relation  
19 to its preferred embodiment, it is to be understood that many  
20 other possible modifications and variations can be made  
21 without departing from the spirit and scope of the invention  
22 as hereinafter claimed.  
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